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ABSTRACT

Validity, the most critical of readability formula characteristics, requires that a measuring device actually measure what is intended to be measured. To examine validity, a study was conducted in which ten popular handbooks used in the teaching of college freshman composition were examined for comparative validity data--the extent to which scores developed from two or more formulas agree with each other. The readability formula chosen for validation was the Fry Readability Graph. (Only the Fry graph reports the grade level of the reading material directly from the plotting of syllable and sentence counts on the graph.) The results were compared to the results obtained from the application of three other formulas: Dale-Chall, Flesch, and Farr-Jenkins-Paterson. The data obtained revealed strong agreement among all four formulas in determining whether certain passages were at college reading levels. In view of these results, ease of application became a significant factor. The Fry graph agreed with the Dale-Chall ratings in 27 of the 30 samplings, with the remaining three only a grade apart. The Dale-Chall is widely termed the most accurate of available measures. However, analysis of the passages for the Fry graph was accomplished in several hours while the Dale-Chall requires several weeks. The results indicate that validation should be pursued. (HOD)

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Validation of the Fry Readability Graph Levels 13-17

Judith A. Longo

The Fry Readability Graph has been a familiar, useful, and respected tool of the American classroom teacher since its publication in 1968 (Fry, 1968). In its original form the Fry graph gave a simple means of determining specific designations for grade levels one through twelve followed by another area broadly designated "college." However, in 1977 Edward Fry published an article updating readers on recent activity in the area of readability (Fry, 1977). By means of the article he made minor adjustments in the rules of word count and, by simple extrapolation, he extended the graph to specific grade level designations of thirteen to seventeen. He indicated that no data had been gathered for validation of these designations and invited research to this end. With its extension the Fry graph becomes the only truly easy-to-apply readability device ranging broadly from grades one through seventeen. Because the graph has undergone validation studies of its other levels (Crook, 1977; Fry, 1969; Paolo, 1977), establishing the validity of the college grade equivalents seems appropriate.

Validity, the most critical of the characteristics a readability formula must have, requires that a measuring device actually measure what is intended to be measured. There are three kinds of validity data: original criterion prediction, which means the extent to which formula scores are related to or predict the original criterion scores used in developing the

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formula; comparative validity data, which is the extent to which scores developed from two or more formulas agree with each other; and outside criterion prediction, which is the ability of formula scores to agree with estimates of readability arrived at some other way, such as through comprehension scores, judgments by experts, and readership opinions (Klare, 1963).

Comparative validity data seem the most significant to the study at hand. The two remaining kinds of validity data are generally more significant to those who are concerned with preparing readable materials rather than measuring existing writings. Three reputable formulas whose college grade equivalents invite comparison with the Fry designations are the Dale-Chall (1948), grades thirteen through sixteen, and the Flesch (1948) and Farr-Jenkins-Paterson (1951), both grades thirteen through seventeen. The Dale-Chall formula has been termed the most accurate of the formulas (Klare, 1963; Haugh, 1975; Hansell, 1976; Burkhead and Ulferts, 1977); the Flesch is credited as being the most popular and as having the most research data available (Klare, 1963); the Farr-Jenkins-Paterson, a simplification of the Flesch, is the fastest of the earlier readability formulas (Klare, 1963). Each formula has undergone extensive investigation and has been in use for at least thirty years.

Ten popular handbooks used in the teaching of freshman composition at the college level were selected for sampling:

Sheridan Baker, The Complete Stylist and Handbook (New York: Harper and Row, 1976).

Sylvan Barnet and Marcia Stubbs, Barnet & Stubbs's Practical Guide to Writing (3rd ed.; Boston: Little, Brown & Co., 1980).

Frederick Crews, The Random House Handbook (3rd ed.; New York: Random House, 1980).

Robert M. Gorrell and Charlton Laird, Modern English Handbook (6th ed.; Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1976).

Harbrace College Handbook, John C. Hodges and Mary E. Whitten, ed., (8th ed; New York: Harcourt Brace Jovanovich, 1977).

Heath's College Handbook of Composition, Langdon Elsbree, Frederick Bracher and Nell Altizer, ed., 9th ed.; Lexington, Mass.: D.C. Heath and Co., 1976).

The Macmillan Handbook of English, John M. Kierzek and Walker Gibson, rev. by Robert F. Willson, Jr., (6th ed.; New York: Macmillan Co., 1977).

James M. McCrimmon, Writing With a Purpose (7th ed.; Boston: Houghton Mifflin, 1980).

Dean Memering and Frank O'Hare, The Writer's Work Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1980).

Writer's Guide and Index to English, David Ebbitt and Wilma R. Ebbitt, ed., (6th ed.; Glenview, Ill.: Scott, Foresman and Co., 1978).

English handbooks were chosen because they are among the most universal texts experienced by college students; they are frequently selected for the independent use of the students; they cover a common body of material, enabling comparable passages to be selected for analysis. Thus, the information gained from the comparative validity data would be additionally useful in assessing the relative

readability of these handbooks and could be included as a factor in the text selection process.

Each of the four formulas requires random selection of hundred-word passages for the samplings. However, certain sections of each handbook are merely short prescriptive examples of the conventions of English. Three areas of each handbook containing passages suitable for readability analysis are the treatment of the paragraph, the essay, and the research paper. Therefore, treating these sections as articles permitted four random samples per section, for a total of twelve samples of instruction in writing per book. In every case three of the four samples presented actual instruction in writing and the fourth was chosen from one of the models demonstrating the application of the particular technique. The same passages are used for each of the four formulas, with a total of one hundred twenty sample passages used in the study.

The consideration of sampling reliability has been studied extensively. Although an entire text can be examined if desired, this is a time-consuming process not required with the Fry graph. Most other formulas, however, require hundred-word samples per certain number of pages, the number having been determined as a result of the research conducted in developing the formula. Burkhead and Ulferts (1977)studied sample frequency for the Dale-Chall formula. This formula requires hundred-word samples every ten pages, a process which

becomes extremely time-consuming in a long text. Using forty-eight college texts, Burkhead and Ulferts took samples at ten, twenty, thirty, and forty-page intervals and found forty-page samplings to be just as dependable as ten-page. In only one case was there a difference in reading grade levels reported; the text which differed had multiple authors, which may have accounted for the variation. However, over half of the books used in the study had multiple authors without similar variation.

Only the Fry graph reports the grade level of the reading material directly from the plotting of syllable and sentence counts on the graph. The other formulas require a series of mathematical calculations resulting in a raw score. The user is then referred to a conversion table which yields the grade equivalent of the passage. The results obtained from the application of the four formulas to the sample passages are presented in Figure 1. Raw scores are reported parenthetically for the Dale-Chall, Flesch, and Farr-Jenkins-Paterson formulas for purposes of discussion.

		Fry	Dale-Chall	Flesch	Farr-Jenkins-Paterson
Baker	Par	8	9-10 (7.54)	8-9 (68)	10-12 (55)
	Essay	11	11-12 (8.19)	10-12 (53)	10-12 (50)
	Res	10	9-10 (7.79)	10-12 (58)	10-12 (55)
Barnet & Stubbs	Par	12	11-12 (8.48)	10-12 (52)	13-16 (45)
	Essay	14	13-15 (9.08)	13-16 (40)	13-16 (39)
	Res	11	11-12 (8.50)	10-12 (55)	10-12 (53)
Crews	Par	11	11-12 (8.18)	10-12 (53)	13-16 (41)
	Essay	12	11-12 (8.00)	10-12 (50)	13-16 (47)
	Res	12	11-12 (8.44)	10-12 (50)	13-16 (45)
Gorrel & Laird	Par	9	9-10 (7.54)	8-9 (62)	10-12 (53)
	Essay	11	9-10 (7.78)	10-12 (53)	13-16 (47)
	Res	12	11-12 (8.68)	13-16 (47)	10-12 (50)
Harbrace	Par	12	11-12 (8.81)	13-16 (49)	13-16 (41)
	Essay	12	11-12 (8.49)	13-16 (48)	13-16 (44)
	Res	12	11-12 (8.00)	13-16 (47)	13-16 (46)

Figure 1
Readability in Grade Level of Selected English Handbooks

		Fry	Dale-Chall	Flesch	Farr Jenkins-Paterson
Heath	Par	11	11-12 (8.08)	10-12 (52)	10-12 (51)
	Essay	13	13-15 (9.11)	13-16 (47)	13-16 (48)
	Res	10	9-10 (7.83)	10-12 (57)	10-12 (57)
Macmillan	Par	14	13-15 (9.03)	13-16 (39)	13-16 (39)
	Essay	14	13-15 (9.59)	13-16 (40)	13-16 (38)
	Res	11	13-15 (8.08)	10-12 (55)	10-12 (55)
McCrimmon	Par	11	11-12 (8.24)	10-12 (55)	13-16 (48)
	Essay	11	11-12 (8.29)	10-12 (56)	10-12 (55)
	Res	11	11-12 (8.00)	10-12 (51)	13-16 (46)
Memering & O'Hare	Par	12	11-12 (8.46)	10-12 (51)	13-16 (45)
	Essay	12	11-12 (8.53)	13-16 (49)	10-12 (50)
	Res	13	11-12 (8.28)	13-16 (48)	13-16 (46)
Writer's Guide	Par	12	11-12 (8.03)	10-12 (52)	10-12 (53)
	Essay	14	13-15 (9.01)	13-16 (44)	13-16 (44)
	Res	14	13-15 (9.23)	13-16 (42)	13-16 (45)

Figure 1 (continued)

One inherent problem in comparative data is the variation in grade equivalents yielded by raw scores. For example, the Dale Chall uses 9-10 and 11-12 while the Flesch and Farr-Jenkins-Paterson ranges are 8-9 and 10-12. Therefore, certain areas of strong agreement may not be apparent, as in the case of the research section of the Heath text. The Fry graph places the level at grade ten. The Dale-Chall raw score of 7.83 would also indicate grade ten because of the movement in the direction of 8.0, the beginning of grade eleven. Likewise, the Flesch and Farr-Jenkins-Paterson raw scores of 57 are moving toward 60, the beginning of the cut-off point downward to grade nine, so those formulas would also place the writing at tenth-grade level.

While there is no uniform standard for validation of a readability formula, the large number of passages which are not at college grade equivalent diminishes the amount of data available for validation by this study. Figure 2 presents data from handbook sections falling within levels 13-17 as determined by the Fry graph and shows the grade equivalents derived from the other formulas.

		Fry	Dale-Chall	Flesch	Farr-Jenkins-Paterson
Barnet & Stubbs	Essay	14	13-15	13-16	13-16
Heath	Essay	13	13-15	13-16	13-16
Macmillan	Par	14	13-15	13-16	13-16
	Essay	14	13-15	13-16	13-16
Memering & O'Hare	Res	13	11-12	13-16	13-16
Writer's Guide	Essay	14	13-15	13-16	13-16
	Res	14	13-15	13-16	13-16

Figure 2

Passages Within Grade Levels 13-17

The data reveal strong agreement among all four formulas in determining certain passages to be at college reading levels. Seven samplings ranked at college readability according to the Fry graph. Of the twenty-one possible comparisons to those levels from the Dale-Chall, Flesch, and Farr-Jenkins-Paterson ratings, twenty concurred with the Fry grade equivalents. Only the Dale-Chall score for the research section of the Memering and O'Hare handbook is not in accord with the other formula results.

Some related observations with regard to the readability formulas used may be appropriate here. In view of the very strong correlation between the results obtained through the Fry graph as compared to the Dale-Chall and Flesch formulas, ease of application becomes a significant factor. The Fry graph agreed with the Dale-Chall ratings in twenty-seven of the thirty samplings, with the remaining three only a grade apart. The Dale-Chall is widely termed the most accurate of available measures. However, analysis of the passages for the Fry graph was accomplished in several hours, while the Dale-Chall required several weeks. The painstaking checking of the Dale list and rules for application was a tedious process which could not be kept at continuously. Although the Dale list is now adapted for the computer, the average teacher would not have easy access to this as an alternative. The question of analyst reliablity may also be pertinent.

The rules for the Dale-Chall formula are posited on the user's ability to determine the grammatical function of a given word in some cases. For example, the rule for verbs states in part, "Consider familiar the third-person, singular forms (s or ies from y), present-participle forms (ing), past-participle forms (n), and past-tense forms (ed or ied from y), when these are added to verbs appearing on the list." However, a later rule under "Miscellaneous Special Cases"

states, "Words formed by adding en to a word on the list (unless the en is listed in parentheses or the word itself appears on the list) are considered unfamiliar." A check of the list reveals, for example, the word fall but not fallen, and the analyst must decide whether to term it "familiar" as a past participle according to its function or simply to apply the second rule and label it "unfamiliar." In the early years of the formula's use, an educated person could be expected to have a working knowledge of grammar, but the same assumption now may present inconsistences in the application of the rules.

Application of the Flesch formula is not as difficult, but it does require several operations on a calculator and is, therefore, still more time-consuming than the Fry. The Farr-Jenkins-Paterson as a simplification of the Flesch does not seem as reliable on upper level material. In all cases the Farr-Jenkins-Paterson differed from the other three measures by reporting higher levels of difficulty. The only difference between the Flesch and Farr-Jenkins-Paterson is that the latter counts only one-syllable words. The Farr-Jenkins-Paterson was tested on 360 one-hundred word passages from twenty-two handbooks put out by various divisions of the General Motors Corporation. The passages generally rated 10th-12th grade readability, but no testing is reported for higher grade levels. In view of the strong agreement among the other measures, it would appear that the number of one-syllable words in a passage may not be as significant as the total number of syllables in the passage,

particularly at upper levels of difficulty, where unfamiliar polysyllabic words may vastly decrease readability.

The very promising results from the comparative validity data for the Fry graph indicate that validation should be pursued. Upper level material such as psychology, economics, or accounting texts would be reasonable choices for further data. Certainly the data from this study present strong evidence for the validity of the upper levels of the graph, specifically the last two grades of high school and the first two years of college. However, if a subsequent study is undertaken, it is suggested that the Farr-Jenkins-Paterson formula be eliminated because of the unevenness of its results. The substantial validity data available for the Dale-Chall and Flesch formulas support their use in another comparative study.

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